



This document includes the MPCD Option Summary of the Draft EPA Report "Surface Vessel Bilgewater/Oil Water Separator Feasibility Impact Analysis Report" published in 2003. The reference number is: EPA-842-D-06-019

DRAFT
Feasibility Impact Analysis Report
Surface Vessel Bilgewater/Oil Water
Separator

MPCD Option Summary

2003

1.0 MPCD Option Summary

The following tables provide a summary of the feasibility impact analysis for each representative vessel. The tables denote the current MPCD; all comparisons are relative to the current MPCD. The following symbols are used in the summary tables:

NA = not applicable

NE = not estimated

NF = not feasible

2.0 LKA 113 Class MPCD Options

LKA 113 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Centrifuge	NF – support services not available								
Current MPCD * CHT	No impact— within current holding capacity	No impact	No impact	No impact	NA	None	None	None	None
Evaporation	NF – support services not available								
Gravity Coalescer	NF – support services not available								
Hydrocyclone	NF – support services not available								
<i>In situ</i> Biological Treatment	NE - determined not to provide significant environmental benefit to the current practice								
Oil Absorbing Socks	NE - determined not to provide significant environmental benefit to the current practice								
Filter Media	NF – requires pretreatment through primary OWS, for which support services are not available								
Membrane Filtration	NF – requires pretreatment through primary OWS, for which support services are not available								

LKA 113 MPCD Cost Comparison

MPCD Option	INITIAL COSTS			RECURRING COSTS					
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	USCG Waste Disposal Inside 12 nm	USCG Waste Disposal Outside 12 nm	Other Armed Services Waste Disposal Inside 12 nm	Other Armed Services Waste Disposal Outside 12 nm
Centrifuge	NF – support services not available								
CHT (within current holding capacity)	CHT is the both the current and preferred practice therefore no costs were calculated								
Evaporation	NF – support services not available								
Gravity Coalescence	NF – support services not available								
Hydrocyclone	NF – support services not available								
<i>In Situ</i> Biological Treatment	NE – determined not to provide significant environmental benefit to the current practice								
OAS	NE – determined not to provide significant environmental benefit to the current practice								
Filter Media	NF – support services not available								
Membrane Filtration	NF – support services not available								

LKA 113 MPCD Total Ownership Cost Comparison

MPCD Option	Total Initial Inside 12 nm/ Inside+Beyond 12 nm	USCG Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	USCG Annualized Inside 12 nm/ Inside+Beyond 12 nm	USCG Total Ownership Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Annualized Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
Centrifuge	NF – support services not available						
CHT (within current holding capacity)	CHT is the both the current and preferred practice therefore no costs were calculated						
Evaporation	NF – support services not available						
Gravity Coalescence	NF – support services not available						
Hydrocyclone	NF – support services not available						
<i>In Situ</i> Biological Treatment	NE – determined not to provide significant environmental benefit to the current practice therefore costs were not calculated						
OAS	NE – determined not to provide significant environmental benefit to the current practice therefore costs were not calculated						
Filter Media	NF – support services not available						
Membrane Filtration	NF – support services not available						

3.0 CVN 68 Class MPCD Options

CVN 68 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD* (Gravity Coalescer)	163 ft ³ 4,800 lbs. (dry) 9,000 lbs (flooded) No impact – current MPCD	No impact	No impact	245 hrs	386 hrs	None	Electrical power— 440VAC, 60Hz Potable water— needed as a primer Sea water—25 psi Gravity drain	Automated control panel, remote tank level switches, and OCM	None
Centrifuge	766 ft ³ 6,300 lbs (dry) 7,000 lbs (flooded) Existing OWS would be removed and replaced with unit	No impact	No impact	113 hrs	386 hrs	Minimal consumables required. Special tools available from vendor	Electrical power— 440VAC, 80- 130kW Compressed Air-- 0.0045-0.022 cfm @ 50 psig Potable water— 50 gpd, 45 psi Gravity drain	Automated control panel (vendor recommends operator oversight during startup), integrated thermostat to control heater, can be equipped with OCM	None
CHT—operating from port with shoreside facilities	No impact— within current holding capacity; can support an approximate 6 hours of transit time	No impact	No impact	750 hrs	NA	None	None	None	None
CHT—operating from port without shoreside facilities	Significant impact after two days	Significant impact after two days	Significant impact after two days	Significant impact after two days	NA	None	None	None	None
Evaporation	NF – excessive power requirements								

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Hydrocyclone	168 ft ³ 900 lbs (dry) 1,000 lbs (flooded) Existing OWSs would be removed	No impact	No impact	79 hrs	386 hrs	Consumables and repair parts (e.g., "O" rings, gaskets for cyclone vessel, cyclone liners, and pump components) required	Electrical power—460VAC, 60 Hz	Automated control panel, tank level switches, can be equipped with OCM	None
<i>In Situ</i> Biological Treatment	NF – excessive bilgewater volume								
Oil-Absorbing Socks	NF – potential safety (e.g., fire and flooding) hazard; solid waste handling impacts								
Filter Media	87 ft ³ 3,650 lbs (dry) 8,375 lbs (flooded) Existing workbench and storage locker may have to be removed; deballasting tanks and piping may have to be relocated.	No impact	No impact	11 hrs	NA	Requires replacement of filter media canisters	None	Automated operation in response to primary OWS	Systems were removed from DDG because they failed to consistently produce effluent less than 15 ppm.
Membrane Filtration	440 ft ³ 9,200 lbs (dry) 12,000 lbs (flooded) Significant impacts on older vessels; extent of impacts on other vessels will vary	No impact	No impact	42 hrs	NA	Requires replacement of membranes (performed shoreside)	Electrical power—440VAC, 60 HZ Compressed Air – 5 scfm at 80 to 100 psi Potable water – 10 gpm at 30 psi Gravity drain	Automated operation in response to primary OWS	None

CVN 68 MPCD Initial and Recurring Cost Comparison (\$K/vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS			
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	Waste Disposal Inside 12 nm	Waste Disposal Outside 12 nm
Gravity Coalescence	0	0	0	5.56	8.73	0	0
Centrifuge	904	252	14.23	2.55	8.73	0	0
CHT (within current holding capacity)	0	0	0	17.0	0	202.5	0
Hydrocyclone	62	148.2	13.59	1.8	8.73	0	0
Filter Media	78.0	116.9	12.30	.250	0	0	0
Membrane Filtration	600	354	14.77	.96	0	0	0

CVN 68 MPCD Total Ownership Cost Comparison (\$K/vessel)

MPCD Option	Initial Inside 12 nm/ Inside+Beyond 12 nm	15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Annualized Inside 12 nm/ Inside+Beyond 12 nm	Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
Gravity Coalescence	0/0	62/180	5.3/15.3	62/180
Centrifuge	1170/1170	28.4/97	102/108	1200/1270
CHT (within current holding capacity)	0/0	2440/2440	207/207	2440/2440
Hydrocyclone	224/224	20/91.4	20.7/27.3	244/321
Filter Media	208/208	869/869	91.5/91.5	1080/1080
Membrane Filtration	968/968	11/11	83.2/83.2	979/979

4.0 LHD 1 Class MPCD Options

LHD 1 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD * (Gravity Coalescer)	162 ft ³ 4,800 lbs. (dry) 9,000 lbs (flooded) No impact	No impact	No impact	212 hrs	132 hrs	None	Electrical power—440VAC, 60Hz Potable water— primer, 25 psi max Sea water— 25 psi Gravity drain	Automated control panel, remote tank level switches, and OCM	None
Centrifuge	787 ft ³ 6,300 lbs (dry) 7,000 lbs (flooded) Existing OWS would be removed and replaced with unit	No impact	No impact	81 hrs	132 hrs	Minimal consumables required; special tools required, but included in the initial purchase	Electrical power— 440VAC Compressed Air – 0.0058-0.029 scfm @ 50 psig Potable water— 50 gpd, 45 psi Gravity drain Seawater- 25 psi	Automated control panel (vendor recommends operator oversight during startup), integrated thermostat to control heater, can be equipped with OCM	None
CHT—operating from port with shoreside facilities	No impact— within current holding capacity	No impact	No impact	710 hrs	NA	None	None	None	None
CHT—operating from port without shoreside facilities	Significant impact after one day	Significant impact after one day	Significant impact after one day	Significant impact after one day	NA	None	None	None	None
Evaporation	NF – excessive power requirements								

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Hydrocyclone	168 ft ³ 900 lbs (dry) 1,000 lbs (flooded) OWSs may have to be removed and replaced with a single unit.	No impact	No impact	46 hrs	132 hrs	Minimal consumables and repair parts required	Electrical power—460VAC, 60 Hz	Automated control panel, tank level switches; can be equipped with OCM	None
<i>In Situ</i> Biological Treatment	NF – excessive bilgewater volume								
Oil Absorbing Socks	NF – potential safety (e.g., fire and flooding) hazard; solid waste handling impacts								
Filter Media	85 ft ³ 3,650 lbs (dry) 8,375 lbs (flooded) Existing workbench and storage locker may have to be removed; deballasting tanks and piping may have to be relocated.	No impact	No impact	5.3 hrs	NA	Requires replacement of filter media canisters	None	Automated operation in response to primary OWS	Systems were removed from DDG because they failed to consistently produce effluent less than 15 ppm.
Membrane Filtration	441 ft ³ 9,200 lbs (dry) 12,000 lbs (flooded) Significant impacts on older vessels; extent of impacts on other vessels will vary	No impact	No impact	28 hrs	NA	Requires replacement of membranes (performed shoreside)	Electrical power—440VAC, 60 HZ Compressed Air – 5 scfm at 80 to 100 psi Potable water – 10 gpm at 30 psi Gravity drain	Automated operation in response to primary OWS	None

LHD 1 MPCD Initial and Recurring Cost Comparison (\$K/vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS			
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	Waste Disposal Inside 12 nm	Waste Disposal Outside 12 nm
Gravity Coalescence	0	0	0	4.80	2.980	0	0
Centrifuge	904	238.6	1.830	1.80	2.980	0	0
CHT (within current holding capacity)	0	0	0	16.0	0	96.0	0
Hydrocyclone	62	124	17.058	1.0	2.980	0	0
Filter Media	78.38	150.4	16.372	120	37.0	0	0
Membrane Filtration	600	320.7	22.302	0.632	0	0	0

LHD 1 MPCD Total Ownership Cost Comparison (\$K/vessel)

MPCD Option	Initial Inside 12 nm/ Inside+Beyond 12 nm	15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Annualized Inside 12 nm/ Inside+Beyond 12 nm	Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
Gravity Coalescence	0/0	53.5/86.7	4.5/7.4	53.5/86.7
Centrifuge	1161/1161	20/53	100/103	1181/1214
CHT (within current holding capacity)	0/0	1249/1249	106/106	1249/1249
Hydrocyclone	203/203	11/44	18/21	214/247
Filter Media	245/245	412/412	56/56	660/660
Membrane Filtration	943/943	7/7	81/81	950/950

5.0 DDG 51 Class MPCD Options

DDG 51 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD* (Gravity Coalescer)	62.5 ft ³ 1,250 lbs (dry) 2,710 lbs (flooded) No impact	No impact	No impact	18 hrs	77 hrs	None	Electrical power—440 VAC, 60Hz Potable water—potential primer Sea water—primer Gravity drain	Automated control panel, remote tank level switches, and OCM	None
Centrifuge	134 ft ³ 2,650 lbs (dry) 2,700 lbs (flooded) Existing OWS would be removed and replaced with unit	No impact	No impact	29 hrs	45 hrs	Minimal consumables required; special tools required, but included in the initial purchase	Electrical power—440 VAC Compressed Air – 0.0058-0.029 cfm at 50 psig Potable water—20 gpd at 45 psi Sea water—25 psi Gravity drain	Automated control panel (vendor recommends operator oversight during startup), integrated thermostat to control heater, can be equipped with OCM	None
CHT—operating from port with shoreside facilities	No impact—within current holding capacity	No impact	No impact	56 hrs	NA	None	None	None	None
CHT—operating from port without shoreside facilities	Significant impact after five days	Significant impact after five days	Significant impact after five days	Significant impact after five days	NA	None	None	None	None
Evaporation	NF – excessive power requirements								

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Hydrocyclone	17 ft ³ 132 lbs (dry) 150 lbs (flooded) Existing OWS would be removed and replaced with unit	No impact	No impact	10.5 hrs	51 hrs	Consumables and repair parts required (e.g., "O" rings, gaskets for cyclone liners, and pump components)	Compressed Air – 18 scfm at 65 psi	Automated control panel; tank level switches; can be equipped with OCM	None
<i>In Situ</i> Biological Treatment	NF – excessive bilgewater volume								
Oil-Absorbing Socks	NF – potential safety (e.g., fire and flooding) hazard; solid waste handling impacts								
Filter Media	16.9 ft ³ 730 lbs (dry) 1675 lbs (flooded) Relocation of piping, furniture, and equipment would be required	No impact	No impact	0.23 hrs	NA	Requires replacement of filter media canisters	None	Automatic operation in response to primary OWS	Systems were removed from DDG because they failed to consistently produce effluent less than 15 ppm.
Membrane Filtration	227.5 ft ³ 2,700 lbs (dry) 3,000 lbs (flooded) Some space and weight impacts	No impact	No impact	9.85 hrs	NA	Requires replacement of membranes (performed shoreside) No consumables or special tools required	Electrical power—440VAC, 60Hz Compressed Air—80-100 psi, 5 scfm Potable water—10 gpm at 30 psi Gravity drain	Automatic operation in response to primary OWS	None

DDG 51 MPCD Initial and Recurring Cost Comparison (\$K/Vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS			
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	Waste Disposal Inside 12 nm	Waste Disposal Outside 12 nm
Gravity Coalescence	0	0	0	.410	1.7	0	0

MPCD Option	INITIAL COSTS			RECURRING COSTS			
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	Waste Disposal Inside 12 nm	Waste Disposal Outside 12 nm
Centrifuge	138	69.46	2.328	0.66	1.0	0	0
CHT (within current holding capacity)	0	0	0	1.3	0	4.168	0
Hydrocyclone	7.6	52.74	2.254	.250	1.2	0	0
Filter Media	16	66.17	2.177	.005	0	0	0
Membrane Filtration	200	74.87	2.331	.220	0	0	0

DDG 51 MPCD Total Ownership Cost Comparison (\$K/Vessel)

MPCD Option	Initial Inside 12 nm/ Inside+Beyond 12 nm	15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Annualized Inside 12 nm/ Inside+Beyond 12 nm	Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
Gravity Coalescence	0/0	4.6/19	.4/1.6	4.6/19
Centrifuge	210/210	6.9/11	18.4/18.8	217/221
CHT (within current holding capacity)	0/0	61/61	5.2/5.2	61/61
Hydrocyclone	62.6/62.6	2.8/13.4	5.6/6.5	65.4/76
Filter Media	84/84	18/18	8.8/8.8	104/104
Membrane Filtration	280/280	2.4/2.4	24/24	282/282

6.0 DD 963 Class MPCD Options

DD 963 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD * (Gravity Coalescer)	63 ft ³ 1,250 lbs (dry) 2,710 lbs (flooded) No impact	No impact	No impact	122 hrs	456 hrs	None	Electrical power—440VAC, 60Hz Potable water—potential primer Sea water—primer Gravity drain	Automated control panel, remote tank level switches, and OCM	None
Centrifuge	136.5 ft ³ 2,650 lbs (dry) 2,700 lbs (flooded) Existing OWS would be removed and replaced with unit	No impact	No impact	91 hrs	260 hrs	Minimal consumables required. Special tools required, but included in the initial purchase.	Electrical power—440VAC, 60-100kW Compressed Air--0.0058-0.029 scfm @ 50 psig Potable water—20 gpd, 45 psi Sea water—25 psi Gravity drain	Automated control panel (vendor recommends operator oversight during startup), integrated thermostat to control heater, can be equipped with OCM	None
CHT—operating from port with shoreside facilities	No impact—within current holding capacity	No impact	No impact	270 hrs	NA	None	None	None	None
CHT—operating from port without shoreside facilities	Significant impact after one day	Significant impact after one day	Significant impact after one day	Significant impact after one day	NA	None	None	None	None
Evaporation	NF – excessive power requirements								
Hydrocyclone	17 ft ³ 132 lbs (dry) 150 lbs (flooded) Existing OWS would be removed and replaced with unit	No impact	No impact	81.5 hrs	300 hrs	Minimal consumables required.	Compressed Air: 18 scfm at 65 psi	Automated control panel; tank level switches; can be equipped with OCM	None

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
In-Situ Biological Treatment	NF – excessive bilgewater volume								
Oil-Absorbing Socks	NF – potential safety (e.g., fire and flooding) hazard; solid waste handling impacts								
Filter Media	16.9 ft ³ 730 lbs (dry) 1675 lbs (flooded) Relocation of existing furniture required	No impact	No impact	2 hrs	NA	Requires replacement of filter media canisters	None	Automatic operation in response to primary OWS	Systems were removed from DDG because they failed to consistently produce effluent less than 15 ppm.
Membrane Filtration	227.5 ft ³ 2,700 lbs (dry) 3,000 lbs (flooded) No impact	No impact	No impact	35 hrs	NA	Requires replacement of membranes (performed shoreside)	Electrical power—440VAC, 60Hz Compressed Air—80-100 psi, 5 scfm Potable water—10 gpm, 30 psi Gravity drain	Automatic operation in response to primary OWS	None

DD 963 MPCD Initial and Recurring Cost Comparison (\$K/Vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS			
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	Waste Disposal Inside 12 nm	Waste Disposal Outside 12 nm
Gravity Coalescence	0	0	0	2.8	10	0	0
Centrifuge	138	103.3	5.696	2.1	6.0	0	0
CHT (within current holding capacity)	0	0	0	6.1	0	36.3	0
Hydrocyclone	7.6	89.45	5.427	1.9	6.9	0	0
Filter Media	16	63.76	4.906	.045	0	0	0
Membrane Filtration	200	92.25	5.257	.79	0	0	0

DD 963 MPCD Total Ownership Cost Comparison (\$K/Vessel)

MPCD Option	Initial Inside 12 nm/ Inside+Beyond 12 nm	15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Annualized Inside 12 nm/ Inside+Beyond 12 nm	Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
Gravity Coalescence	0/0	32/150	2.7/13	31/150
Centrifuge	247/247	23/90	22.9/28.6	270/337
CHT (within current holding capacity)	0/0	473/473	40.2/40.2	473/473
Hydrocyclone	102.5/102.5	21/97	11/17	123/200
Filter Media	85/85	160/160	21/21	250/250
Membrane Filtration	300/300	8.8/8.8	26/26	310/310

7.0 WHEC 378 Class MPCD Options

WHEC 378 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD* (Gravity Coalescer)	130 ft ³ 1,400 lbs (dry) 4,300 (flooded) No impact	No impact	No impact	19.3 hrs	1.8 hrs	None	Electrical power—440VAC, 60Hz, motor – 1.5 HP Sea water—primer Gravity drain	Automated control panel, remote tank level switches, and OCM	None
Centrifuge	393 ft ³ 6,610 lbs (dry) 7,385 lbs (flooded) Existing OWS would be removed and replaced with unit	No impact	No impact	21.1 hrs	1.6 hrs	Minimal consumables required. Special tools required, but included in the initial purchase.	Electrical power.—440VAC, 80-130kW Compressed Air—.0058-.029 scfm @ 50 psig Potable water—50 gpd, 45 psi Gravity drain	Automated control panel (vendor recommends operator oversight during startup), integrated thermostat to control heater, can be equipped with OCM	None
CHT—operating from port with shoreside facilities	No impact—within current holding capacity	No impact	No impact	2.9 hrs	NA	None	None	None	None
CHT—operating from port without shoreside facilities	Significant impact after five days	Significant impact after five days	Significant impact after five days	Significant impact after five days	NA	None	None	None	None
Evaporation	NF – excessive power requirements								
Hydrocyclone	168 ft ³ 900 lbs (dry) 1,000 lbs (flooded) Existing OWS would be removed and replaced with unit	No impact	No impact	6.3 hrs	1.6 hrs	Minimal consumables and repair parts required	Electrical power—440VAC, 60Hz	Automated control panel	None

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MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
In-Situ Biological Treatment	NF – excessive bilgewater volume								
Oil-Absorbing Socks	NF – potential safety (e.g., fire and flooding) hazard; solid waste handling impacts								
Filter Media	NF – adequate space is not available								
Membrane Filtration	NF – adequate space is not available								

WHEC 378 MPCD Initial and Recurring Cost Comparison (\$K/Vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS			
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	Waste Disposal Inside 12 nm	Waste Disposal Outside 12 nm
Gravity Coalescence	0	0	0	0.437	0.04	0.053	0.253
Centrifuge	452	169	10.477	0.477	0.037	0.053	0.253
CHT (within current holding capacity)	0	0	0	0.066	NA	5.31	NA
Hydrocyclone	62	149	9.777	0.144	0.037	0.053	0.253

WHEC 378 MPCD Total Ownership Cost Comparison (\$K/Vessel)

MPCD Option	Initial Inside 12 nm/ Inside+Beyond 12 nm	15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Annualized Inside 12 nm/ Inside+Beyond 12 nm	Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
Gravity Coalescence	0/0	5.46/3.25	0.464/0.277	5.46/3.25
Centrifuge	632/632	5.65/3.02	54/53.9	637/635
CHT (within current holding capacity)	0/0	59.89/59.89	5.09/5.09	59.89/59.89
Hydrocyclone	220/220	2.18/3.20	18.9/19.0	222/223

8.0 LSD 41 Class MPCD Options

LSD 41 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD* (Gravity Coalescer)	126 ft ³ 2,500 lbs (dry) 5,420 lbs (flooded) No impact	No impact	No impact	79 hrs	286 hrs	None	Electrical power – 440 VAC, 60 Hz Potable water – potential primer Sea water – primer Gravity drain	Automated control panel, remote tank level switches, and OCM	None
Centrifuge	137 ft ³ 2,650 lbs (flooded) 2,700 lbs (flooded) Existing OWS would be removed and replaced with unit	No impact	No impact	91.75 hrs	280 hrs	Minimal consumables required. Special tools required, but included in the initial purchase.	Electrical power— 440VAC, 60-100kW Compressed Air-- 0.0058-0.029 cfm @ 50 psig Potable water—20 gpd, 45 psi Sea water – 25 psi Gravity drain	Automated control panel (vendor recommends operator oversight during startup), integrated thermostat to control heater, can be equipped with OCM	None
CHT—operating from port with shoreside facilities	No impact – within current holding capacity	No impact	No impact	480 hrs	NA	None	None	None	None
CHT—operating from port without shoreside facilities	Significant impact after two days.	Significant impact after two days.	Significant impact after two days.	Significant impact after two days.	NA	None	None	None	None
Evaporation	NF – excessive power requirements								
Hydrocyclone	17 ft ³ 132 lbs (dry) 150 lbs (flooded) OWS would be removed and replaced with unit	No impact	No impact	55.5 hrs	217 hrs	Minimal consumables and repair parts required	Compressed Air 27scfm @ 65 psi	Automated control panel; tank level switches; can be equipped with OCM	None

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
In -Situ Biological Treatment	NF – excessive bilgewater volume								
Oil-Absorbing Socks	NF – potential safety (e.g., fire and flooding) hazard; solid waste handling impacts								
Filter Media	16.9 ft ³ 730 lbs (dry) 1,675 lbs (flooded) Relocation of workbench and phone required	No impact	No impact	2.0 hrs	NA	Requires replacement of filter media canisters	None	Automatic operations in response to primary OWS	Systems were removed from DDG because they failed to consistently produce effluent less than 15 ppm.
Membrane Filtration	227.5 ft ³ 2,700 lbs (dry) 3,000 lbs (flooded) Some space and weight impacts	No impact	No impact	18.4 hrs	NA	Requires replacement of membranes (performed shoreside)	Electrical power—440VAC, 60Hz Compressed Air - 80-100 psi, 5 scfm Potable water—10 gpm, 30 psi Gravity drain	Automatic operation in response to primary OWS	None

LSD 41 MPCD Initial and Recurring Cost Comparison (\$K/Vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS					
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	USCG Waste Disposal Inside 12 nm	USCGWaste Disposal Outside 12 nm	Other Armed Services Waste Disposal Inside 12 nm	Other Armed Services Waste Disposal Outside 12 nm
Gravity Coalescence	0	0	0	1.8	6.46	4.323	17.29	0	0
Centrifuge	138	146.3	16.02	2.1	6.4	4.323	17.29	0	0
CHT (within current holding capacity)	0	0	0	11.0	0	432.3	0	35.8	0
Hydrocyclone	7.6	100.3	14.94	1.3	4.91	4.323	17.29	0	0
Filter Media	15.68	108.6	13.49	.044	0	0	0	0	0
Membrane Filtration	200	112	14.09	.417	0	4.279	0	0	0

LSD 41 MPCD Total Ownership Cost Comparison (\$K/Vessel)

MPCD Option	Total Initial Inside 12 nm/ Inside+Beyond 12 nm	USCG Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	USCG Annualized Inside 12 nm/ Inside+Beyond 12 nm	USCG Total Ownership Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Annualized Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
Gravity Coalescence	0/0	68/333	5.8/28.3	68/333	20/92	1.7/7.8	20/92
Centrifuge	301/301	71.3/335	31.6/54.0	372/636	23.4/94.7	27.5/33.6	324/396
CHT (within current holding capacity)	0/0	4940/4940	420/420	4940/4940	520/520	44/44	520/520
Hydrocyclone	123/123	62.4/310	15.8/36.8	185/433	14.5/69	11.7/16.3	138/192
Filter Media	145/145	160/160	25.6/25.6	301/301	160/160	25.6/25.6	301/301
Membrane Filtration	330/330	52.34/52.34	32.2/32.2	380/380	4.65/4.65	28.1/28.1	331/331

9.0 MCM 1 Class MPCD Options

MCM 1 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD* (Gravity Coalescer)	15 ft ³ 300 lbs (dry) 455 lbs (flooded) No impact	No impact	No impact	40.5 hrs	36 hrs	None	Electrical power.— 115/230VAC 60Hz Fresh, salt, or brackish water – pressure regulated to 15 psi	Automated control panel, remote tank level switches, and OCM	None
Centrifuge	6.9 ft ³ 132 lbs (dry) OWS would be removed and replaced with unit	No impact	No impact	35.75 hrs	53 hrs	Minimal consumables and repair parts required	440 VAC Potable water- 1 gpd	Manual startup, OCM	None
CHT—operating from port with shoreside facilities	No impact— within current holding capacity	No impact	No impact	75.6 hr	NA	None	None	None	None
CHT—operating from port without shoreside facilities	Significant impact after 3 days	Significant impact after 3 days	Significant impact after 3 days	Significant impact after 3 days	NA	None	None	None	None
Evaporation	NF – adequate space not available; excessive power requirements								
Hydrocyclone	8 ft ³ 88 lbs (dry) 100 lbs (flooded) OWS would be removed and replaced with unit	No impact	No impact	16.5 hrs	27 hrs	Minimal consumables and repair parts required	Compressed Air – 65 psi, 12 scfm	Automated control panel, tank level switches	None
In-Situ Biological Treatment	NF – excessive bilgewater volume								
Oil-Absorbing Socks	NF – potential safety (e.g., fire and flooding) hazard; solid waste handling impacts								

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MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Filter Media	36 ft ³ 1320 lbs (dry) 1900 lbs (flooded) ¹ Relocation of piping, furniture and equipment required	No impact	No impact	0.11 hrs	0 hrs	Requires filter media canisters, which need to be replaced every 400 hours of operation	None	None	Systems were removed from DDG because they failed to consistently produce effluent less than 15 ppm.
Membrane Filtration	227.5 ft ³ 2500 lbs (dry) ¹	No impact	No impact	10.56 hrs	.51 hrs	Minimal consumables and repair parts required	440 VAC, 60 hz Compressed Air – 80-100 psi, 5 scfm Potable Water – 10 gpm at 30 psi	None	None

¹ Space and weight impacts depend on individual vessel.

MCM 1 MPCD Initial and Recurring Cost Comparison (\$K/Vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS					
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	USCG Waste Disposal Inside 12 nm	USCG Waste Disposal Outside 12 nm	Other Armed Services Waste Disposal Inside 12 nm	Other Armed Services Waste Disposal Outside 12 nm
Gravity Coalescence	0	0	0	.910	.800	.248	.448	0	0
Centrifuge	6.52	81.0	8.324	0.810	1.20	.248	.448	0	0
CHT (within current holding capacity)	0	0	0	1.70	0	24.75	0	2.037	0
Hydrocyclone	5.603	79.0	8.324	.372	.611	.248	.448	0	0
Filter Media	15.675	70.0	8.324	.003	0	0	0	0	0
Membrane Filtration	200	200	9.566	.239	0	.245	0	0	0

MCM 1 MPCD Total Ownership Cost Comparison (\$K/Vessel)

MPCD Option	Total Initial Inside 12 nm/ Inside+Beyond 12 nm	USCG Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	USCG Annualized Inside 12 nm/ Inside+Beyond 12 nm	USCG Total Ownership Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Annualized Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
Gravity Coalescence	0/0	12.9/26.8	1.10/2.279	12.9/26.8	10.1/19	.861/1.62	10.1/19
Centrifuge	96/96	11.5/29.4	9.12/10.7	107/125	8.78/22.1	8.88/10	104/118
CHT (within current holding capacity)	0/0	294.9/294.9	25/06/25.06	294.9/294.9	41.8/41.8	3.55/3.55	41.8/41.8
Hydrocyclone	93/93	6.9/18.7	8.49/9.49	99.9/112	4.15/11	8.3/8.83	97/104
Filter Media	94/94	9.25/9.25	8.77/8.77	103/103	9.25/9.25	8.77/8.77	103/103
Membrane Filtration	410/410	2.65/2.65	35.1/35.1	413/413	2.65/2.65	35.1/35.1	413/413

10.0 WPB 110 Class MPCD Options

WPB 110 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD* (Gravity Coalescer)	12.5 ft ³ 132 lbs (dry) 190 lbs (flooded) No impact	No impact	No impact	4.1 hrs	0.39 hrs	None	Electrical power.— 110/220VAC, 50/60Hz, 1 Phase	Automated control panel, remote tank level switches, and OCM	None
Centrifuge	7 ft ³ 132 lbs (dry) OWS would be removed and replaced with unit	No impact	No impact	9.85 hrs	0.39 hrs	Minimal consumables and repair parts required	440 VAC Potable water- 1 gpd	Manual startup, OCM	None
CHT—operating from port with shoreside facilities	No impact— within current holding capacity	No impact	No impact	1.2 hr	NA	None	None	None	None
CHT—operating from port without shoreside facilities	No impact— within current holding capacity	No impact	No impact	No impact	NA	None	None	None	None
Evaporation	NF – adequate space not available; excessive power requirements								
Hydrocyclone	NF – compressed air not available								
<i>In Situ</i> Biological Treatment	NF – cannot support batch treatment process								
Oil Absorbing Socks	NF – potential safety (e.g., fire and flooding) hazard; solid waste handling impacts								
Filter Media	NF – adequate space not available								
Membrane Filtration	NF – adequate space not available								

WPB 110 MPCD Initial and Recurring Cost Comparison (\$K/Vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS					
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	USCG Waste Disposal Inside 12 nm	USCG Waste Disposal Outside 12 nm	Other Armed Services Waste Disposal Inside 12 nm	Other Armed Services Waste Disposal Outside 12 nm
Gravity Coalescence	0	0	0	.093	.009	.025	.003	0	0
Centrifuge	6.52	54.77	2.312	0.22	0.009	.025	.003	0	0
CHT (within current holding capacity)	0	0	0	.026	0	2.545	0	.210	0

WPB 110 MPCD Total Ownership Cost Comparison (\$K/Vessel)

MPCD Option	Total Initial Inside 12 nm/ Inside+Beyond 12 nm	USCG Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	USCG Annualized Inside 12 nm/ Inside+Beyond 12 nm	USCG Total Ownership Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Annualized Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
Gravity Coalescence	0/0	1.3/1.5	.11/.13	1.3/1.5	1.0/1.1	0.09/0.09	1.0/1.1
Centrifuge	63.6/63.6	2.8/2.9	5.6/5.7	66.4/66.5	2.5/2.6	5.6/5.6	66/66.1
CHT (within current holding capacity)	0/0	28.66/28.66	2.436/2.436	28.66/28.66	2.63/2.63	.223/.223	2.63/2.63

11.0 UTB 41 Class MPCD Options

UTB 41 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD* CHT	No impact—within current holding capacity	No impact	No impact	180 hrs	NA	None	None	None	None
Centrifuge	NF – excessive power requirements; adequate space not available								
Evaporation	NF – excessive power requirements; adequate space not available								
Gravity Coalescer	NF – excessive power requirements; adequate space not available								
Hydrocyclone	NF – excessive power requirements; adequate space not available								
<i>In Situ</i> Biological Treatment	Significant impact Excessive bilgewater volume	No impact	Significant impact	Minimal impact	NA	None	None	None	Unknown long-term effects on aluminum hulls
Oil Absorbing Socks	NF – potential safety (e.g., fire and flooding) hazard; solid waste handling impacts								
Filter Media	271 in ³ 3.5 lbs (dry) 6.5 lbs (flooded)	No impact	Negative impact	2.2 hrs.	NA	No consumables or special tools required	None	None	Systems were removed from DDG because they failed to consistently produce effluent less than 15 ppm.
Membrane Filtration	NF – requires pretreatment through primary OWS, for which support services are not available								

UTB 41 MPCD Initial and Recurring Cost Comparison (\$K/Vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS					
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	USCG Waste Disposal Inside 12 nm	USCG Waste Disposal Outside 12 nm	Other Armed Services Waste Disposal Inside 12 nm	Other Armed Services Waste Disposal Outside 12 nm
CHT (within current holding capacity)	0	0	0	4.1	0	.810	0	0.067	0
<i>In situ</i> Biological Treatment ¹	0	0	0.150	0	0	0 ²	0	0 ²	0
Filter Media	.480	1.500	.080	.051	0	0	0	0	0

¹ The recurring costs of *In Situ* Biological Treatment do not reflect the costs of materials, which could be as low as 0.700 per year.

² Because bilgewater may be transferred to shore more frequently than once each month, the recurring costs of this potential MPCD could increase significantly.

UTB 41 MPCD Total Ownership Cost Comparison (\$K/Vessel)

MPCD Option	Total Initial Inside 12 nm/ Inside+Beyond 12 nm	USCG Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	USCG Annualized Inside 12 nm/ Inside+Beyond 12 nm	USCG Total Ownership Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Annualized Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
CHT	0/0	58/58	4.9/4.9	58/58	49/49	4.2/4.2	49/49
<i>In situ</i> Biological Treatment	0.15/0.15	8.6/8.6	0.7/0.7	8.75/8.75	8.6/8.6	0.7/0.7	8.75/8.75
Filter Media	2.06/2.06	0.6/0.6	0.22/0.22	2.66/2.66	0.6/0.6	0.22/0.22	2.66/2.66

12.0 QST 35 Class MPCD Options

QST 35 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD * CHT	No impact— within current holding capacity	No impact	No impact	7 hrs	NA	None	None	None	None
Centrifuge	NF – excessive power requirements								
Evaporation	NF – excessive power requirements; adequate space is not available								
Gravity Coalescer	NF – excessive power requirements; adequate space is not available								
Hydrocyclone	NF – compressed air not available; adequate space is not available								
<i>In Situ</i> Biological Treatment	NE – determined not to provide significant environmental benefit to the current practice								
Oil Absorbing Socks	NF – potential safety (e.g., fire and flooding) hazard; solid waste handling impacts								
Filter Media	271 ft 3.5 lbs (dry) 6.5 lbs (flooded)	No impact	No impact	1.6 hrs	NA	Requires replacement of filter media canisters	None	None	Systems were removed from DDG because they failed to consistently produce effluent less than 15 ppm.
Membrane Filtration	NF – adequate space is not available; requires pretreatment through primary OWS, for which support services are not available								

QST 35 MPCD Initial and Recurring Cost Comparison (\$K/Vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS					
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	USCG Waste Disposal Inside 12 nm	USCG Waste Disposal Outside 12 nm	Other Armed Services Waste Disposal Inside 12 nm	Other Armed Services Waste Disposal Outside 12 nm
CHT	0	0	0	.151	0	.584	0	.048	0
Filter Media	.440	1.25	0.5	.036	0	0	0	0	0

QST 35 MPCD Total Ownership Cost Comparison (\$K/vessel)

MPCD Option	Total Initial Inside 12 nm/ Inside+Beyond 12 nm	USCG Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	USCG Annualized Inside 12 nm/ Inside+Beyond 12 nm	USCG Total Ownership Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Annualized Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
CHT (within current holding capacity)	0/0	8.2/8.2	0.7/0.7	8.2/8.2	2.2/2.2	0.2/0.2	2.2/2.2
Filter Media	2.19/2.19	0.4/0.4	0.2/0.2	2.6/2.6	0.4/0.4	0.2/0.2	2.6/2.6

13.0 CB-M Class MPCD Options

CB-M Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD* CHT	No impact— within current holding capacity	No impact	No impact	18 hrs	NA	None	None	None	None
Centrifuge	NF – excessive power requirements								
Evaporation	NF – excessive power requirements; adequate space not available								
Gravity Coalescer	NF – excessive power requirements; adequate space not available								
Hydrocyclone	NF – compressed air not available; adequate space not available								
In-Situ Biological Treatment	NE – determined not to provide significant environmental benefit to the current practice								
Oil-Absorbing Socks	NE – determined not to provide significant environmental benefit to the current practice								
Filter Media	NE – determined not to provide significant environmental benefit to the current practice								
Membrane Filtration	NF – excessive power requirements								

CB-M MPCD Initial and Recurring Cost Comparison (\$K/Vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS					
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	USCG Waste Disposal Inside 12 nm	USCG Waste Disposal Outside 12 nm	Other Armed Services Waste Disposal Inside 12 nm	Other Armed Services Waste Disposal Outside 12 nm
CHT (within current holding capacity)	0	0	0	0.400	0	.127	0	.010	0

CB-M MPCD Total Ownership Cost Comparison (\$K/Vessel)

MPCD Option	Total Initial Inside 12 nm/ Inside+Beyond 12 nm	USCG Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	USCG Annualized Inside 12 nm/ Inside+Beyond 12 nm	USCG Total Ownership Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Annualized Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
CHT	0/0	5.8/5.8	0.5/0.5	5.8/5.8	4.5/4.5	0.4/0.4	4.5/4.5

14.0 YC 1607 Class MPCD Options

YC 1607 Summary of Practicability and Operational Impact Analysis

MPCD Option	PRACTICABILITY AND OPERATIONAL IMPACT STUDY								
	Space and Weight	Personnel/ Equipment Safety	Mission Capabilities	Personnel Impact (operator labor hrs/year)		Consumables, Repair Parts, and Tools	Interface Requirements	Control System Requirements	Other/ Unique Impacts
				Within 12 nm (inc. maintenance)	Beyond 12 nm				
Current MPCD* CHT—operating from port with shoreside facilities	No impact—within current holding capacity	Tanks must be certified by a gas-free engineer.	No impact	6 hrs	NA	None	None	None	None
Centrifuge	NF – utilities not available to support MPCD								
Evaporation	NF – utilities not available to support MPCD								
Gravity Coalescer	NF – utilities not available to support MPCD								
Hydrocyclone	NF – utilities not available to support MPCD								
<i>In Situ</i> Biological Treatment	NE – determined not to provide significant environmental benefit to the current practice								
Oil Absorbing Socks	NE – determined not to provide significant environmental benefit to the current practice								
Filter Media	NF – utilities not available to support MPCD								
Membrane Filtration	NF – utilities not available to support MPCD								

YC 1607 MPCD Initial and Recurring Cost Comparison (\$K/Vessel)

MPCD Option	INITIAL COSTS			RECURRING COSTS					
	Acquisition	Installation	Technical Data Development	Operator Labor Inside 12 nm	Operator Labor Outside 12 nm	USCG Waste Disposal Inside 12 nm	USCG Waste Disposal Outside 12 nm	Other Armed Services Waste Disposal Inside 12 nm	Other Armed Services Waste Disposal Outside 12 nm
CHT	0	0	0	.136	0	.083	0	.007	0

YC 1607 MPCD Total Ownership Cost Comparison (\$K/Vessel)

MPCD Option	Total Initial Inside 12 nm/ Inside+Beyond 12 nm	USCG Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	USCG Annualized Inside 12 nm/ Inside+Beyond 12 nm	USCG Total Ownership Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total 15-Yr Recurring Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Annualized Inside 12 nm/ Inside+Beyond 12 nm	Other Military Services Total Ownership Inside 12 nm/ Inside+Beyond 12 nm
CHT	0/0	2.44/2.44	0.207/0.207	2.44/2.44	1.59/1.59	0.135/0.135	1.59/1.59